

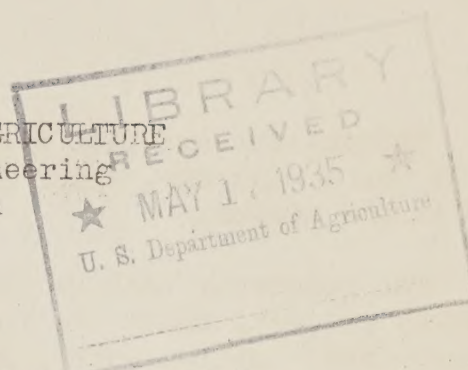
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UNITED STATES DEPARTMENT OF AGRICULTURE  
Bureau of Agricultural Engineering  
Division of Irrigation



The Agricultural Situation in the Irrigation States  
on April 1, 1935

ARIZONA

Agricultural conditions generally continue highly favorable. Additional rain has fallen. Ranges are improving daily. There is more water in storage for irrigation purposes than a year ago. Lettuce growers in Salt River Valley are enjoying a prosperous season. The crop is maturing slowly on account of cold weather, but prices are soaring, due to the fact that no other producing area is competing heavily at this time, and will not be for two or three weeks. Harvesting of strawberries in the Valley is under way. The crop is estimated at 100,000 crates. The first crop of alfalfa hay will be cut the first week of April. The cotton acreage will be about the same as that of last year.

All over the southern portion of the State, the rainfall is above the normal of a 39-year period and the ranges are reported better than since 1926. Small areas in the northern part of the State report necessity to haul feed to keep cattle alive, but this condition is caused by there being no feed when the cold weather came; there has been enough snow to make feed as soon as warmer weather arrives.

The upper Gila Valley is in better shape than for several years. There has been plenty of water in the river all winter and there is still plenty.

The San Carlos reservoir at this time last year held 90,659 acre-feet of water. It now holds 189,350 acre-feet.

The Salt River Valley Water Users' Association reservoirs on this date hold 656,577 acre-feet; on March 30, 1934, they contained 572,795 acre-feet.

During January, February, and March, the Verde River, which joins the Salt River below the storage reservoirs, has been at flood stage for a considerable period. The following were the diversions at Granite Reef:

	<u>1934</u>	<u>1935</u>
	ac. ft.	ac. ft.
January	48,734	54,000
February	42,389	86,000
March	75,791	90,659
	<u>166,914</u>	<u>230,659</u>



Indications are that the land is more nearly saturated at this date than it was a year ago, which should lessen the draft on the storage water later in the season.

The reservoir back of Carl Pleasant Dam which irrigates land on the Beardsley project, shows the following: Stored water, April 4, 1934, - 413 acre-feet; stored water, April 4, 1935, - 54,500 acre-feet; capacity of reservoir, - 184,000 acre-feet; cropped acreage anticipated for 1935, - 10,000 acres.

## CALIFORNIA

Although cool weather has held back vegetable crops during the last two or three weeks, and frost has done some damage to both citrus and deciduous fruits, agricultural conditions in California continue to be highly favorable, as any such loss is offset many times by heavy rains which have given the state the best supply of moisture in years. The rainfall is far above normal, and there is a heavy pack of snow in the mountains insuring irrigation water later.

The average precipitation for the State as a whole exceeded the normal by about 9 percent. Monthly totals were generally above in central California, and below normal in northern and extreme southern districts. The snowfall was heavy, and the depth on the ground at the close of the month was well above normal at the higher stations of the Sierra Nevada. Seasonal precipitation totals held closely to the normal in the northern two-thirds, and were well above the southern third of the State, the desert regions excepted. Precipitation occurred at frequent intervals from the 1st to the 9th, and from the 17th to the 25th; the number of rainy days exceeded the March average. Sunshine exceeded the normal in the northern and was slightly deficient in the southern half of the State.

Mean rainfall to date at 42 places in southern California, mostly in Los Angeles County, is 40 percent above the amount for the same period last year. At 21 places in Orange County the increase is 87 percent above 1934. Reports from the Sierra Nevada Mountains show that a vigorous March storm added 16 inches of snow to the peaks and brought the pack to 160 inches, within two inches of the all-time record for this time of year.

Reports on underground water conditions indicate that wells which were depleted last fall below the levels for the previous year have recovered the amount of depletion and water levels are now nearly the same as for a year ago, or in some localities substantially better, while heavy rains continuing well into April indicate a reduced pumping draft for the season, although replenishment will still fall far short of depletion. In fact, no draft has yet been made on the underground supplies as distribution of rainfall during the winter has made irrigation unnecessary. Some stream flow is still available for water-spreading in southern California.

Snow coverage in the Sierra is very heavy and of high water content. The engineering department of the Pacific Gas and Electric Company reports, for the reservoirs under its control or in which it has interests (which include the major irrigation reservoirs in northern California), that while run-



off on April 1 had not yet reached the necessary volume especially in the higher altitudes, all would certainly fill or come very close to doing so. Huntington, Shaver, and Florence reservoirs then held little water, all being in high altitudes, but are confidently expected to fill. Exchequer reservoir on April 1 held 151,525 acre-feet; its capacity is 281,200 acre-feet. Don Pedro held 246,300 out of 290,200. Pardee and O'shaughnessy held 70,390 and 10,824 respectively, out of capacities of 210,174 and 205,052. These two latter are municipal supply reservoirs essentially, and the low stage of Pardee is attributable to diversion of water to other storage in order to make its capacity available for later run-off. Both are expected to fill.

On the basis of the precipitation records for the stations in the mountainous areas of the various drainages, together with such data from snow surveys as are available, the California State Division of Water Resources makes the following estimates of seasonal run-off for 1935. (No snow survey data are available as yet for the Yuba, Kings, and Kaweah drainages, so that the estimates shown for them are based entirely upon precipitation records.)

Estimate of Seasonal Run-off - 1935

Drainage basin	Seasonal runoff in percent of 40 year mean (1889-1929)	
	1934	1935
Upper Sacramento	47	80
Feather	35	90
Yuba	27	90
American	37	85
Sacramento River and Tributaries	41	85
Mokelumne	35	85
Stanislaus	30	95
Tuolumne	40	95
Merced	30	90
Upper San Joaquin	41	95
San Joaquin River and Tributaries	37	95
Combined Sacramento and San Joaquin	40	87
Kings	35	90
Kaweah	29	85
Kern	32	90

In the Colorado River basin comparatively little snowfall was reported for the last half of March. Drying winds were general and probably caused a net loss in snow cover. Snow depth on March 19, 1935 is given for a number of places in the basin.



Location	State	Elevation feet	Depth of snow inches
Bright Angel	Arizona	8,400	50
Cumbres	Colorado	10,015	45
Grand Junction	"	4,600	0
Steamboat Springs	"	6,750	9
Modena	Utah	6,473	0
Silver Lake	"	8,700	67
Soldier Summit	"	7,454	15
Lander	Wyoming	5,372	1

At Bright Angel, Cumbres and Silver Lake snowfall has increased since the March report with a decrease at other places. Reports are more encouraging than a year ago.

There is now small significance in reporting flow in the Colorado River below Yuma on account of regulation at Boulder Dam. On March 25, however, it was 5,860 second-feet. At Grand Canyon it was 6,760 second-feet on March 23, which is representative of the month.

Reservoir storage in northern California is reported generally to be at or near capacity stages (on April 10).

The mean temperature for the State was, with exception of 1917, the lowest of record for March, although there was no severely cold weather. Light to heavy frosts occurred generally in the interior agricultural districts throughout the month, and to the extreme lower coast as late as the 11th. Daily mean temperatures were generally below normal except for short intervals near the middle and close of the month.

The persistently cool weather prior to the last week retarded the growth of vegetation, and frosts did slight damage to almonds, early deciduous fruits, and tender truck in several localities. Orchard heating was necessary on several nights. This condition was somewhat ameliorated by higher temperatures during the last week. Field work likewise has been retarded by the unseasonable weather. Livestock generally are in good condition, except that the cold, wet weather in the northwestern sections has caused the death from exposure of many young lambs. The condition of pastures and ranges generally is excellent. Feed is developing slowly, but with expectation of an ample supply due to adequate rains. The movement of cattle from other States, both feeder and dairy stuff, continues.

Growth of practically all spring vegetable crops has been checked by the cool, damp weather, and shipping of some commodities such as lettuce and asparagus, has been temporarily held up. Damage to deciduous fruits has been confined to cherries, plums, apricots and almonds in the northern part of the San Joaquin Valley, the extent to be determined. Damage to peaches, however, probably will not amount to more than a normal thinning.



Cold nights forced citrus growers to resort to smudging and while there has been some loss in certain areas, the damage is negligible in the face of probably the largest crop in the history of the state. There is a heavy movement of navel oranges with a big crop of Valencias coming up not later than May 1.

According to the California Cooperative Crop Reporting Service, the 1934-35 orange crop may reach a total of 42,115,000 boxes, compared with 28,439,000 boxes in 1933-34. The navel crop, about two-thirds of which has been marketed, is estimated at 19,565,000 boxes, and the forecast for the Valencia crop is 22,550,000 boxes. There also is a heavy crop of lemons.

While it is possible that the frost damaged early vines in a few sections, the grape outlook is promising.

The frost nipped early potatoes in the Shafter-Wasco district; also some of the grain crops in the San Joaquin Valley; but the damage was small.

#### COLORADO and WYOMING

The precipitation in Colorado and Wyoming during March was below normal in most sections, and this was particularly true in the plains areas on the eastern side of the Rocky Mountains. For these areas the prospects for sufficient run-off to take care of the irrigation needs are very poor. The long continued drouth coupled with above-normal temperatures and unusually strong winds make the water situation particularly unpromising this season. Conditions on the western slope of the Rockies are more favorable. The snow-fall in the northwestern part of Wyoming, in North Park, the San Juan Basin and the extreme western part of Colorado has been heavy, and according to all reports practically normal run-off will occur from these areas.

Precipitation records show that during the first three months of 1934 and of 1935 the precipitation was in general below normal. Furthermore, the precipitation so far in 1935 is definitely less than it was during the first three months of 1934. This makes the situation more serious.

The flow of the principal streams of Colorado and Wyoming on or about the last day of March and the relation of the present flow to the normal for the month is given in a table which accompanies this report. These data were furnished by the United States Geological Survey and the State Engineers of Colorado and Wyoming. This table shows clearly the effects of the drouth on the run-off. In practically every case the flow is much below normal. Conditions are worst on the Arkansas and the South Platte, the two streams upon which Colorado is most dependent for its irrigation water supply.

The amount of water in storage in the reservoirs in Colorado and Wyoming is much below normal. The low stage of the streams and the practice of winter irrigation has left but little water for storage. In the Arkansas Valley all the reservoirs are empty. In the South Platte Valley the condition of the reservoir is as follows:



Reservoir	Amount of storage	Proportion of normal
	Acre-feet	Percent
Point of Rocks	29,250	60
Prewitt	4,700	25
Jackson Lake	30,000	90
Empire	empty	--
Riverside	16,000	50
Barr Lake	7,000	30
Antero	empty	--
Cheesman	11,000	15

The amount of storage in the reservoirs on the Poudre River is about the same as the storage on the Platte. Terry Lake, which has the earliest right on the river, is filled to within 55 percent of normal for this time of the year. The other reservoirs on the Poudre are practically empty.

Conditions in Wyoming are not much better. The Pathfinder Reservoir has 93,000 acre-feet in storage. The normal is 300,000 acre-feet. Guernsey Reservoir has 27,320 acre-feet in storage. The normal is 45,000 acre-feet. The Shoshone Reservoir had a large carry-over from last year so there is no danger of a shortage from this reservoir. It is estimated that the Wheatland Reservoir will fill this year although last year the supply was extremely short.

The fact that the drouth has continued throughout March has caused considerable apprehension as to the water supply for irrigation this season. Conditions will be materially improved if normal rainfall occurs in April and May, but unless unusually heavy rainfall occurs there will be a pronounced shortage of water this year in Colorado and Wyoming.

Preparation of land for crops in the Arkansas Valley is nearly completed. While contracts for sugar beet production have not been signed by the growers and the sugar factories, it is supposed that the acreage will be slightly under that of 1934 to meet government requirements.

Cantaloupe acreage will be about the same as that of last year. Onion growers have not decided upon their acreage, delay being caused by the uncertainty of water for irrigation. However, the growers still have time to act, and if they decide that the necessary water can be developed, they probably will plant a normal acreage.

Vegetable growers are planning better than average acreages, an increase being made particularly on tomatoes. Canneries in the Valley provide a market for the total production.



The wheat crop will be short, due to the drouth at planting time, to later winter killing, and to dust storms recently. Storms have been particularly severe in the southeastern part of the state. Feed crops will take the place of the abandoned wheat acreage. The uplands, which depend upon rain and snow for moisture, are dry, but farmers expect to plant the usual acreages to feed crops.

Pastures are slow coming on, as a result of dry weather.

Stream Flow Data for Colorado and Wyoming for March, 1935

River	Station	Date of: measure- ment	Flow	Percent- age of normal <sup>1/</sup>	Years of record
			Cu. ft. sec.		
Colorado					
South Platte	:Waterton	March 30:	2	10	7
"	:Kersey	" 30:	60	11	29
"	:Julesburg	" 20:	59	10	30
Poudre	:Canon	" 30:	20	30	51
Thompson	:Canon	" 30:	15	65	19
St. Vrain	:Canon	" 30:	11	61	30
Clear Creek	:Golden	" 30:	45	88	25
Arkansas	:Canon City	" 30:	78	21	47
"	:Pueblo	" 31:	10	3	22
"	:Lamar	" 31:	3	5	19
North Platte	:North Gate	" 29:	220	85	19
Laramie	:Jelm	"	2/40	98	26
Rio Grande	:Del Norte	" 20:	220	70	45
"	:Lobatos	" 22:	96	18	35
Conejos	:Mogote	" 22:	54	57	31
Colorado	:Glenwood Springs	" 29:	972	101	35
"	:Hot Sulphur Springs	" 25:	110	73	23
White	:Meeker	" 28:	243	66	30
Gunnison	:Grand Junction	" 26:	796	72	22
Roaring Fork	:Glenwood Springs	" 29:	313	70	27
Taylor	:Almont	" 18:	107	77	26
Fraser	:West Portal	" 22:	6	81	24
Wyoming					
North Platte	:Saratoga	" 27:	292	56	32
Bighorn	:Thermopolis	" 26:	656	75	30
Powder	:Arvada	" 13:	274	36	18
Green	:Green River	" 22:	594	74	31
Bear	:Evanston	" 26:	86	49	21

<sup>1/</sup> The percentage of normal is based on the average flow for the month for the period of years indicated.

<sup>2/</sup> Amount estimated.



# IDAHO

The water situation in southern Idaho, where the great bulk of the irrigated land of the State is located and where critical water shortages have centered, appears certain to be far better than last year. There will be no shortage on either Payette or Weiser Rivers. On the Boise there may be some need for economy in the use of water if it develops that all of the water now in sight cannot be conserved. The Snake River area appears to be assured of practically a full supply. Smaller areas under Salmon Falls Creek, Big and Little Lost Rivers, Raft River, Mud Lake and lesser sources will perhaps suffer considerably from drouth again this year.

The following information on rainfall has been obtained from H.G. Carter, Meteorologist in charge of the Boise, Idaho Weather Bureau Office.

## Average Precipitation for Idaho for Period October 1 to March 31 (Based on preliminary tabulations)

Period:	Depth of Rainfall in Inches				
	Division of State				State
	North	Southwest	South Central	Southeast	
Normal	17.11	12.69	6.90	6.36	10.96
1933-34	20.08	10.54	5.98	5.99	10.83
1934-35	21.63	11.53	4.83	4.16	11.90

The following information on water stored in Idaho reservoirs is based on reports made by watermasters and project superintendents. Current reports are issued for only a few of the larger reservoirs in this State and these generally represent conditions in the best watered districts. The data given in the table should be viewed in this light:

## Status of Stored Waters in Idaho

	: Maximum :	:	:	:	:
Reservoir	: capacity	: Water stored last year	:	Water stored this year	:
	: Acre-feet	: Date	: Acre-feet	: Date	: Acre-feet
	:	:	:	:	:
Jackson Lake	: 847,000	: 4-4-34	: 331,460	: 3-30-35	: 161,500
American Falls	: 1,700,000	: 4-4-34	: 1,139,070	: 3-30-35	: 738,630
Lake Walcott	: 100,000	: --	: --	: 3-30-35	: 85,290
Magic	: 191,500	: --	: --	: --	: --
Arrowrock	: 268,000	: 4-5-34	: 230,960	: 4-5-35	: 86,900
Deer Flat	: 177,000	: 4-5-34	: 142,730	: 4-5-35	: 153,950

A few well-qualified watermasters and project superintendents have made estimates of 1935 water supply for their districts, which appear on the following page.



The following snow survey data have been obtained, principally from Forest Service observers:

#### Upper Snake River Basin

The snow is deeper at both high and low elevations, is well packed, and has a higher moisture content than last year

#### Wood River Basin

Burley.-- South slopes bare below 7,000 feet; above this elevation some snow, ranging from 18 to 36 inches in depth, being greater than last year; snow solid and considerably drifted; soil, except in lower elevations, is open and as snow melts water penetrates promptly; soil in valleys moist down to 8 or 10 inches; below that there is no trace of free water for considerable depths. - S.S. Stewart.

Extracts from Burley: No perceptible runoff in the small drainages of the foothills .... Some of the larger streams are starting to increase their flows at this time .... Prospects are much better at this time than last year for a fair runoff. The high winds, however, are removing large amounts of moisture by evaporation. Excepting for the Oakley reservoir, which records about 18 inches greater depth than last year, indications in all the agricultural sections are very unfavorable. The Raft River and Salmon Falls tracts are exceptionally dry, with dust storms prevailing .... Evidence points to a repeated drouth which might equal that of last year.-- S.S. Stewart.

#### Bear River Drainage Basin

Montpelier.-- Snow exceptionally well packed and of high water content; large drifts found on leeward of ridges; frost out of ground and earth is moist to depth of 2 or 3 feet; prospects for a good moisture supply this year are favorable.- F.S. Moore.

#### Lost River Basin

Challis.-- Depths greater than a year ago; snow is solid, well drifted, and of high water content; ground under snow mostly unfrozen and moist.- E.E. McKee.

#### Payette River Basin

Boise.-- Depths average nearly twice that of last year but still somewhat below normal; snow heavy with high moisture content; ground in most places unfrozen and moist.- W. B. Rice.

#### Weiser River Basin

Weiser.-- Snow cover unbroken from 3,500 feet elevation up; below 5,500 feet, south slopes bare, north slopes still covered; snow well settled and very solid with high water content; snow drifted more than normal; ground unfrozen and moist more than twice the depths of a year ago.- J. Raphael.



# Estimates of Irrigation Water Supplies in Idaho for 1935

District	Area irrigated	Normal run- off plus carry-over	Water required for irrigated area	1934 Proportion of normal require- ment	1935 Proportion of normal require- ment	1935 Proportion of normal require- ment	Date and authority
	Acres	Acre-feet	Acre-feet	Percent	Percent	Percent	
Water Dist. #36	1,000,000	8,500,000	6,500,000	56	74	60	78
Snake River							Crandall 1 3-9-35
above Milner							do 4-4-35
Mude Lake	60,000	1/ 43,000	2/ 90,000	91	43	91	43
Big Lost River	40,078	215,606	2/ 220,000	45.4	20	60	Gardner 3-22-35
Boise Valley	334,000	4/ 1,675,000	4/ 2,327,000	53	73	75	Thompson 3-22-35
							Welsh 3-1-35
						70+	100
							do 4-1-35

1/ Average for period 1931-34 all of which years were in dry cycle. Owing to new water development (artesian supply) normal supply for longer period would not be comparable to present conditions. Perhaps during years of normal run-off the appearance of over-development in this District may not be so apparent.

2/ Delivered at point of diversion and not including a carriage loss which normally is 10 percent and during dry years may be as much as 49 percent.

3/ After allowing a carriage loss of 49 percent.

4/ Including 275,000 acre-feet of return-flow.

5/ Provided run-off occurs so that all of the water may be stored or used. This is not always possible.



## KANSAS

No irrigation storage reservoirs exist in Kansas. Much of the irrigation is dependent upon gravity diversions from Arkansas River, the flow of which threatens to be very low (see Colorado). Other important supplies are obtained by pumping from wells. No reports regarding the pumping prospects are at hand, but it is assumed that the present irrigation wells have not been seriously affected by the drought, while a considerable extension of this type of irrigation should be expected in the low-lift areas of Arkansas Valley in the western part of the State.

## MONTANA

For the area along the divide north of Helena the snowfall has been somewhat below that of last season and far below normal. For the area between Helena and the Yellowstone Park the amount of snow in storage is practically the same as for last year, but far below normal. The indications are that for this area and all mountainous areas farther east and south the snowfall is very small, and consequently there will be a serious shortage of water for irrigation during the coming season. It is believed that no serious shortage will occur in the western part of the State where the snowfall is nearly normal. On account of the fact that there was but very little moisture in the soil at the beginning of the winter a great deal of the water now in storage in the mountains will be absorbed by the soil and will not reach the streams.

Montana's snow came rather late this year, which together with depleted ground water would indicate deficiency in the later summer flow, even though the spring run-off will be sufficient for all existing storage, and if ample storage were available it would insure sufficient supply for the season.

In general, storage is under-developed in this State so that the existing reservoirs may be filled, even though the supply may be much below normal. Prospects of water supply for this season are, in detail, as follows:

Snow and ground moisture conditions are better than for the past two years, but probably not enough better to much more than balance the cumulative effect of the past five year deficiency. The prospect this year is probably better than last year.

Columbia drainage, Clarks Fork, Flathead and Bitter Root areas give nearly normal promise of run-off. East of the continental divide, the Beaverhead run-off is better than for several years, promising to fill the new storage of some 100,000 acre-feet. However, other head-waters of the Missouri are not much better than last year.

The Sun River and Marias drainage had better than a normal supply last year and promise to be sufficient this season.

Central and northern parts of the State are generally deficient. The Musselshell run-off will be better than last year but probably much below normal. The Yellowstone drainage area is generally deficient. In this area there is more snow but the ground water is seriously depleted.

# NEBRASKA

Over the eastern non-irrigated part of the State moisture conditions are about fair. With a normal supply of moisture for the balance of the season crop production over this area should be reasonably good. Exact figures on precipitation data are not available at this time.

For the western and irrigated portion the precipitation for March has been above normal. Practically all the March moisture came in two storms, the first occurring early in the month and the second well toward its end.

In western Nebraska dust storms have been more intense and have continued longer than for many years past. This has been partly due to the fact that the farmers have done considerable cultivation during the high winds which have been especially prevalent this spring.

In a general way damage from these dust storms has not been so serious as might be assumed. Over some limited areas, considerable blowing and drifting has taken place, but this erosion is confined principally to the extremely sandy acreages and the more undesirable farm land. Perhaps the most serious damage is to the net work of canals and laterals comprising the irrigation systems around Scottsbluff. In many sections the main canals and distributing laterals have been completely plugged. Expense for cleaning and preparing these units for operation this season will greatly exceed that required during normal years. The manager of one of the larger canal systems of the Valley estimates that his company will have to expend at least \$8,000 to \$10,000 above normal requirement for such cleaning. For the entire Valley undoubtedly a much larger sum will be spent for these cleaning operations.

Stream flow and storage for irrigation are shown in the following tabulation:

## Platte River System:-

### North Platte River

		Proportion of 5-year mean (1930-34) for same date	
<u>Date</u>	<u>Station</u>	<u>Amount c.f.s.</u>	<u>Percent</u>
4-1	Torrington, Wyo.	230	40
4-1	Wyoming-Nebraska line	240	45
4-1-	Mitchell, Nebr.	245	29
4-3	Minatare, Nebr.	500	46
4-4	Bridgeport, Nebr.	655	48
4-2	Lisco, Nebr.	845	--



North Platte River (Cont'd)

Proportion of 5-year  
mean (1930-34) for  
same date

<u>Date</u>	<u>Station</u>	<u>Amount</u> <u>c.f.s.</u>	<u>Percent</u>
4-2	Oshkosh, Nebr.	700	40
3-30	Martin, Nebr.	710	--
3-28	North Platte, Nebr.	890	45

South Platte River

4-2	Julesburg, Colo.	40	8
3-29	Ogallala, Nebr.	15	--

Platte River

4-2	Below Thirty Mile Canal Diversion	0	--
3-30	Overton, Nebr.	200	9

Storage in Reservoirs - North Platte River

Proportion of 5-year  
mean (1930-34) for  
same date

<u>Reservoir</u>	<u>Date</u>	<u>Amount</u>	<u>Year</u> <u>ago</u> <u>Acre-feet</u>	<u>Percent</u>
Pathfinder				
(storage)	3-31	92,060 ac-ft.	259,000	25
Inflow	3-31	569 cfs	--	60
Outflow	3-31	20 cfs	--	71
Guernsey				
(storage)	3-31	27,320 ac-ft.	42,000	57
Inflow	3-31	140 cfs	--	46
Outflow	3-31	206 cfs <u>1/</u>	--	72

1/ Used for power purposes.

There are many conflicting reports relative to the present snow cover. Many maintain that it is considerably above normal; others that it is below normal and even less than last year at this time.

Except for sugar beets, farm operations are pressing forward. Sugar beet farmers are not satisfied with the contract offered by the Great Western Sugar Company for 1935. At a meeting held April 5, by a vote of 395 to 11 they expressed themselves as not wanting to grow beets unless they get a full guarantee of \$7.13 per ton. Soil moisture is good for starting all crops in North Platte Valley.

NEVADA

The following paragraphs summarize water supply conditions as of April 1 and prospects for the irrigation season. Concluding them is the preliminary forecast of stream flow for April to July, 1935 by the Nevada Cooperative Snow Surveys. This forecast is based upon the March survey

since which time there has been considerable increase in snow storage. It is anticipated the April forecast will show considerable increase in the percentages of normal run-off over those shown by the preliminary forecast.

The following data on storage on the Walker River have been furnished by the Walker River Irrigation District:

Storage carry-over <u>Oct. 1, 1934</u>		Storage <u>April 1, 1935</u>
Bridgeport Reservoir	430	17,903 acre-feet
Topaz Reservoir	1030	25,646 " "

Lahontan Reservoir, Newlands Project, had practically no carryover, with storage on April 1, 63,092 acre-feet and on April 9, 76,780 acre-feet, and a draft for irrigation of 173 second-feet. The storage in Lahontan is the lowest for this period of the year since the dam was built, but it is anticipated the supply in this reservoir with the expected run-off and careful use will be sufficient for the season's use for lands watered under the reservoir.

Although water supply conditions on the Humboldt basin indicate an improvement over last year, the situation is as yet none too favorable. The snow survey on the upper Humboldt Basin as of March 1 showed nearly 15 percent more snow present than last season. However, the season follows the driest on record, resulting in a depleted water table which will require a large amount of water for priming. There have also been some good storms in this basin since the March survey and no doubt the April forecast will show a decided improvement in the percentages of normal run-off.

Preliminary forecast of stream flow  
for April-July, 1935

	<u>Acre-feet</u>	<u>Proportion of normal Percent</u>
For Truckee River at Iceland not including Tahoe	180,000	55.3
Carson River at Ft. Churchill	87,000	37.8
West Walker River at Coleville	115,000	60.2
East Walker River at Bridgeport Dam	33,000	45.2

These estimates indicate much better flows than occurred in 1934.

The preliminary snow surveys on which this forecast is based, include courses near Boca, Truckee, Summit, Soda Springs, Tahoe City, Marletter Lake, Carson Pass, Blue Lakes and Buckeye Roughs on Buckeye Creek west of Bridgeport.

The Buckeye Roughs survey was made March 9 and if the April 1 survey at Center Mountain course shows up as well relatively, the East and West Walker should yield more than here estimated.



The other courses were surveyed February 23 - March 3, hence did not include the storm occurring during the first week of March.

Some rumors are to the effect that snowfall has been heavy in the Independence and Webber Lake regions. If the April 1 survey shows it heavier there relatively than at Summit, the Truckee may yield more at Iceland than estimated.

Lake Tahoe will not rise very much above the rim next summer unless considerably more snow or spring rain occur on the watershed; therefore there will be a shortage of water in the Truckee meadows in July unless pumping from Tahoe is again resorted to.

#### NEW MEXICO

March precipitation for the State averaged 0.39 inch or 0.37 inch below normal. The snowfall of the month was confined mostly to the higher elevations in the Rio Grande and San Juan and Northwest Divisions. The average fall for the season appears to be 18.4 inches or 5.7 inches below normal. Last year the seasonal fall was only 13.5 inches.

The outlook for the San Juan and Northwest continues good, with a near normal run-off indicated. Considerable stored depth continues in the higher elevations. The seasonal fall for the division was 32.4 inches, or 3.1 inches above normal.

The snowfall of the Gila and Southwest Division averaged 3.0 inches for March, or 1.3 inches below normal. The average fall for the season was 11.6 inches, or 6.6 inches below normal. Stream flow prospects are much better than last year, but less than normal flow is indicated. Conditions are favorable for an early run-off.

Conditions continue favorable for the Chama branch of the Rio Grande, and fair for the upper watershed of the main stream of the Rio Grande. However, much of the water from the Chama watershed will be held back by the Vado dam. The seasonal snowfall for this division was 29.3 inches, or 11.3 inches below normal. Conditions indicate considerably below normal run-off for the main stream, but more than last year.

Conditions continue unfavorable for a good run-off for the Pecos River. Stored depth is low and the average snowfall for the season was only 12.5 inches, or 9.7 inches below normal.

Only 0.22 inch of precipitation occurred over the Canadian and Northeast Division during March. The snowfall for the season averaged 12.6 or 15.7 inches below normal. There is very little soil moisture on the plains, and very little stored snow even at the highest elevations. The outlook is poor and conditions are serious.

Late in March several bad dust storms occurred over the eastern half of the State with some damage to winter wheat. Rains are now needed over all sections, except the mountain areas, and the severe drought continues over the northeastern counties. There was considerable melting of

snow and most small streams are showing some rise. On April 1, the stage of the Rio Grande at Espanola was only slightly higher than it was at this time last year.

In the valleys spring farm work progressed without interruption and is, as a general rule, ahead of the season. In southern sections most fruit, except apples, are in bloom and so far there has been very little frost damage. Weeds are green in southern Eddy and Lea Counties, and green grass is showing in many western sections, but in south-central and much of the eastern portion of the State grass is dry and brown. General range conditions are poor. The warmer weather is favorable for livestock, but most stock is in poor condition. Even where the grass is green it has not grown enough to be of any benefit. Around Roswell spring farming is progressing without interruption. Alfalfa and oats look exceptionally well. Truck crops are well advanced. El Paso section reports ranges very dry and rain badly needed. Practically no damage from frost. Bartlett pear trees are beginning to bloom. Water for irrigation scarce.

In general, prospects for irrigation water are not as favorable as at the close of last month, but conditions continue favorable in San Juan Valley and the Southwest, fair to good on the Chama, only fair on the main stream of Rio Grande, and poor on the Pecos and Canadian. Canadian depends mostly, however, on rains for its run-off.

Soil-moisture is very low in eastern sections, the lower Rio Grande Valley, the Pecos Valley and many other scattered areas. Good soil-moisture is reported from most northern mountain districts, the Estancia Valley and the extreme southwestern portion. Soil conditions are very favorable in the Bluewater District.

#### OREGON

The prospects for irrigation water and for moisture in western Oregon continue favorable, but on the wheat lands and on the range lands of eastern Oregon they continue to get worse as the season advances.

The County Agent in Morrow County reports that Butter Creek and Willow Creek, the principal irrigation streams in that county, will probably not furnish any irrigation water at all. Apparently, the lands in Morrow County which are irrigated from the Umatilla Project reservoir only will secure irrigation water this year. The latest report on the situation on the Umatilla project indicates that both McKay and Cold Springs reservoirs will fill this year.

Early in March and again toward the close of the month there were serious dust storms in Wheeler, Jefferson, and Umatilla Counties. A dust storm at this season is a very different thing than a dust storm in the Middle West where the rainy season is ahead rather than behind. The precipitation records for February are the latest available; they show that only two stations in eastern Oregon had more than the normal rainfall. Both were near the southern boundary of the State. It appears that this year the heavier storms have gone to the south of Oregon, whereas last year the heavier storms went to the north. The result is that the central Oregon district has been dry both years.



Except for the south-central portion of the State the precipitation of all sections is below normal for the period October 1 to March 1, the deficiencies ranging from 10 to 20 percent. In an area where the moisture supply is always the limiting factor, a shortage of ten or twenty percent is serious, especially when that shortage is superimposed on a very dry preceding year.

The following tabulation reports reservoir storage as of recent date, with comparable records for 1934. The State Engineer states that "there is considerable snow in the Cascades which has not yet started to melt much. This would account for some of the reservoirs not showing as much water this year as last, especially Crescent Lake."

#### Reservoir Storage in Oregon

Reservoir name	Date	Storage amount	
		1934	1935
		Acre-feet	Acre-feet
Antelope	April 2	7,037	Prospects good
		(Max. recorded)	for full
Wallowa Lake	April 6	23,000	12,175
Owyhee	March 31	139,000	271,520
Warm Springs	March 31	83,500	21,580
Summer Lake	April 8	Full	Est. full
Cottonwood Creek	April 8	1,870	1,681
Drew Creek	April 8	8,790	15,800
Thompson Valley	April 8-9	1,589	1,230
McKay	April 1	50,110	No record
Ochoco	March 31	3,000	4,480
Crane Prairie	March 31	41,210	52,280
Crescent Lake	March 31	43,060	30,920
Emigrant Gap	April 6	3,372	8,270
Fish Lake	April 6	5,757	3,585
Hyatt Prairie	April 6	6,220	3,700
Four Mile Lake	April 6	13,070	4,575

#### TEXAS

Weather conditions during March over the greater part of Texas were generally beneficial, and as a result field activity was greatly speeded up, except in the northwestern and far western parts of the state where abnormally dry or spotted conditions obtain. There is sufficient moisture for present needs, generally, while in the eastern half of the State moisture is abundant. Seasonal work now is about normal, except in the western areas, and outlook for spring planting of crops is excellent.

Ranges and pastures continue to show rapid improvement as warmer weather and beneficial rains bring out grass and weeds. This is particularly true in the eastern half of the State. In the extreme western section conditions are fair to poor, according to needed rain. In north-western sections insufficient moisture and dust storms have been extremely detrimental to ranges and small grain pastures.

During March rainfall was in general below normal throughout Texas. For example, no rain of any consequence occurred at Austin from just prior to the middle of February until March 29 and 30. Precipitation for the month was below normal at El Paso, Abilene, Dallas, Palestine, Austin, and Brownsville, while it was about normal at Wichita Falls and Houston, and above normal (due to doubt to local storms) at Amarillo and San Antonio.

The amount of stream flow during the latter part of March is indicated by the following discharges on representative streams of the State on days near the end of the month (March, 1935) with comparisons with the flow in March, 1934.

Neches River near Rockland. On March 24, a discharge of 1,700 second-feet at this station gradually decreasing to but 1,230 second-feet on March 30. During March, 1934, the mean flow at this station was 7,230 second-feet and the minimum flow was 1,780 second-feet on March 1, 1934.

Brazos River at Richmond. On March 24, 1935 a discharge of 1,440 second-feet, March 29 - 1,100 second-feet, and March 31 - 3,400 second-feet. During March, 1934, the mean flow at this station was 12,800 second-feet and the minimum flow was 2,750 second-feet on March 1, 1934.

Colorado River at San Saba. On March 25, 26, and 29, a discharge of 90 second-feet, and on March 27, 28, and 30, a discharge of but 80 second-feet. During March, 1934, the mean flow at this station was 594 second-feet and the minimum flow was 103 second-feet on March 18, 1934.

Nueces River near Three Rivers. The discharge at this station was but 5 second-feet on March 27, but rose on the following day to 1,950 second-feet due to rains in the watershed. During March, 1934, the mean flow at this station was 121 second-feet and the minimum flow was 13 second-feet on the last 5 days of March, 1934.

Rio Grande at Roma. The gage height at the Roma gaging station became as low as around 1.3 prior to March 25, 1935, rising on that date due to rains up the river. During March, 1934, the gage height at Roma ranged from 2.48 to 3.02, and did not fall below 1.66 during the summer of 1934. Discharge records on the Rio Grande are kept by the International Boundary Commission at El Paso and hence the discharge corresponding to a gage height of 1.3 is not available to me now.

It will be noticed from the above that on all of these rivers the flow has been lower than during March, 1934 - in certain rivers considerably lower. Deliveries of water for irrigation in the Lower Rio Grande Valley were high during March of this year, and with the water level in



the river at the lowest in years there was a threatened shortage of irrigation water in the valley until this condition was relieved by increased flow during the last few days of March, 1935 (gage height at Roma on March 30 was 3.30).

The following tabulation summarizes present storage conditions in a number of representative irrigation and municipal reservoirs:

Reservoir	Stored amount		Proportion 1935 to 1934 Percent
	April 1, 1935 Acre-feet	April 1, 1934 Acre-feet	
Lake Brownwood	16,500	52,900	31
Lake Kemp	310,000	410,000	76
Wichita Diversion	40,000	40,000	100
Balmorhea	6 in. of highest level	Approx. same	Approx. 100
Medina	72,000	147,000	49
Lake Abilene	1,200	4,200	29
Cedar Creek	2,340	4,770	49
Lake Worth	13,000	18,000	72
Eagle Mountain	55,000	15,000	366
Bridgeport	40,000	50,000	80
Paris	12,000	12,000	100
Sweetwater (Bitter Creek)	9,000	10,500	86
Lake Trammell	225	750	30
Mineral Wells	11,250	9,000	125
Lake Dallas	99,000	99,000	100
White Rock	17,100	17,100	100
Corsicana	4,500	5,100	87
Lake Nasworthy	8,400	10,500	80
Greenville	2,000	2,000	100
Cisco	20,000	25,000	80
Waco	34,000	31,250	109
Lake Wichita	9,450	10,050	94
.....			

#### UTAH

Precipitation for the period November 1, 1934, to April 1, 1935, for the State as a whole, was about normal, but with deficiencies and excesses in certain sections. However, the snow cover has about disappeared from the south and west slopes of the lower elevations of the watersheds with no resulting appreciable rise in the stream flow, which means, of course, that the ground has absorbed most if not all of the water. The ground is still comparatively dry. In the valleys north of Salt Lake it is moist for a depth varying from 1 to 2 feet; south of Salt Lake however, it is more nearly 5 to 8 inches with but 3 or 4 inches in depth in the Uintah Basin. The ground on the watersheds of lower elevations is moist for 1 to 1-1/2 feet, and on the higher reaches from 2-1/2 to 3 feet except the ground underneath the trees, which is as dry as powder. Hence the 1935 water supply from April 1

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will be equivalent to the water already stored in existing reservoirs, which is about 40 percent of 1934, plus resulting run-off from the snow remaining on the north and east slopes of the lower reaches and on the snow-covered areas of the higher reaches of the watersheds, supplemented by whatever precipitation may come during the remaining spring and summer. It appears that for high water rights the supply will be about the same as 1933; the storage supply will be much less than 1934, but the supply for primary rights will be more than for 1934 but less than that in 1933. Detail figures for the respective streams are given in the following paragraphs:

#### Bear River Drainage Basin

Bear River. Snow measurements made on the Bear River Basin indicate a deficiency of snow at the head in the Uintah Mountains and on most of the basin above Montpelier, Idaho. Below that point, snowfall has been relatively heavy. The soil is absorbing all of the water as the snow melts and the absorption loss will continue to be heavy. The Bear River above Bear Lake will probably supply 50 percent greater runoff than in 1934 and a 90 percent increase in the river inflow below Bear Lake.

Bear Lake. From October 10, 1934, to April 1, 1935, the storage in Bear Lake was 30,000 acre-feet. From present indications, this will be increased by 70,000 acre-feet, making a total of 100,000 acre-feet lake inflow for 1935 as compared with 64,000 acre-feet inflow in 1934.

Logan and Blacksmith Fork Rivers. The snow cover on the high watersheds in Cache Valley is about double that of 1934, but less than in 1933. Most of the low snow has disappeared, with only a slight stream increase, which shows a high soil absorption that will continue to cause heavy water losses. It is probable that the Logan River run-off will double that of 1934 and the Blacksmith Fork will probably show an 80 percent to 90 percent increase over 1934, but both will be below the run-off of 1933.

#### Weber River

The snow cover on the lower elevations of the Weber River watershed is about the same as in 1934, but on the higher areas it is about the same as or in excess of that of 1933. Much of the soil under the snow is relatively dry and soil absorption will be heavy where there is a deep soil mantle. It is probable that the Weber River run-off will be 80 percent greater than in 1935 and 25 percent less than that of 1933.

Echo Reservoir. On April 1, 1935 the Echo reservoir had in storage 25,500 acre-feet as compared with 35,800 acre-feet in 1934 (of which 11,000 acre-feet was holdover) and 25,000 acre-feet in 1933. It is probable that the spring run-off will fill the reservoir to a total of 45,000 to 50,000 acre-feet as compared with a maximum of 38,000 acre-feet in 1934.

East Canyon Reservoir. On April 1, 1935 the East Canyon reservoir contained 7,300 acre-feet as compared with 14,700 acre-feet in 1934 and 19,000 acre-feet in 1933. It is probable that further storage will fill this reservoir to a total of 14,000 acre-feet for 1935.

#### Ogden River

There are no comparative snow measurements on the Ogden River Basin. However, the snow cover is comparable to that on Blacksmith Fork and Weber rivers. The low snow had largely disappeared by April 1 with not much increase in stream flow. The high snow is better than in 1934. It is probable



that Ogden River run-off will be 50 percent above that of 1934, but there will be no high water.

### Salt Lake City Watersheds

The low snow cover on the watersheds, which furnish Salt Lake City's water supply, had practically all disappeared by April 1 without appreciably increasing the stream flow, which indicates that the mountain soil had absorbed the moisture. It is probable the Mountain Dell reservoir will be filled, while the reservoirs in Big Cottonwood will receive only a partial supply.

### Provo River

Six snow courses on the upper Provo River Basin show the snow cover to be approximately the same as in 1933, and from 50 percent to 200 percent better than in 1934. The low snow had practically all disappeared, causing only a slight increase in the river flow. The soil under the snow is dry and will absorb a considerable part of the moisture as melting occurs. It is probable the runoff in 1935 will be about equal to, or slightly less than in 1933, but better than in 1934. However, there will be but little water from Provo River reach Utah Lake after irrigation commences - probably not to exceed 8,000 acre-feet to 10,000 acre-feet.

### Utah Lake.

The storage in Utah Lake on April 1, 1935 above the limit of the Pelican Point pumps was 118,000 acre-feet as compared with 124,000 acre-feet and 200,000 acre-feet above the Associated pumps for 1934 and 1933, respectively. On April 1, 1935 the lake elevation was -8.8 feet. It may rise to -8.7 feet at the highest point, making 125,000 acre-feet as storage available to Pelican Point pumps. Of this amount, approximately 72,000 acre-feet may be pumped for irrigation while evaporation will consume the remainder. The net yield from the Associated pumps in 1934 was 56,000 acre-feet of the 124,000 acre-feet available. The installation of new pumps at Pelican Point gave access to 112,000 acre-feet of additional water for 1934, of which 36,000 acre-feet was pumped for irrigation, the balance being lost by evaporation. A total of 92,000 acre-feet was pumped from the lake in 1934.

The available water of 72,000 acre-feet from Utah Lake, increased by 4,000 acre-feet from Jordan River, will make 76,000 acre-feet available from Utah Lake and Jordan River for 1935 as compared with 96,000 acre-feet in 1934.

### Ashley Creek

The low snow in the Ashley Creek basin has largely disappeared without causing any rise in the stream flow. The soil under the snow is dry and a considerable portion of the water will be absorbed as melting occurs. It is probable the discharge from Ashley Creek will be better than in 1934 or 1933; however, it will be below normal.



### Strawberry River

The snow cover is deep but is on rather dry soil and confined to a relatively limited area near the head of the river, decreasing in depth throughout the Strawberry Valley. It is probable that the run-off from the higher areas will be less than that of 1933 but considerably more than in 1934.

### Strawberry Reservoir

The Strawberry reservoir had 12,660 acre-feet in storage on April 1, 1935, 5,500 acre-feet of which was made available through a lowered outlet. This compares with 8,770 acre-feet in 1934 and 13,780 acre-feet in 1933.

### Beaver River

Several storms which were somewhat localized added snow to this basin to make its prospects for water more favorable than most parts of the State. The run-off will probably be less than the comparative snow cover would indicate, due to a lack of low snow and the dry condition of the soil under the snow on the higher reaches of the watershed. Primary rights will probably receive a fair supply, but secondary rights and supply for storage will be deficient.

Rocky Ford Reservoir at Minersville. On April 1, 1935 the Rocky Ford reservoir held 6,200 acre-feet as compared with 8,500 acre-feet in 1934 and 10,250 acre-feet in 1933. A lack of low snow in Beaver River Basin indicates there will be little additional inflow for storage, so the total available for 1935 will probably not exceed 6,500 acre-feet.

### Sevier River

Measurements of snow on April 1, 1935 at 6 stations having previous records and 4 stations which were established this year, show a high snow cover from 50 percent to more than 200 percent better than in 1934 and some better than 1933. The snow measurements, if considered without reference to other facts, would indicate a water supply in excess of that in 1933, but a lack of low snow cover and a dry soil mantle will tend to counteract the favorable high snow cover. Melting is taking place even in some of the higher elevations and the low snow cover has entirely disappeared without increasing the stream flow. This moisture loss in the mountain soils will continue to reduce the run-off as melting continues. Sevier River will probably furnish primary rights with a better supply than in 1934, but there will be a serious deficiency for secondary and storage rights.

Piute Reservoir. On April 1, 1935 the Piute reservoir had in storage 26,600 acre-feet as compared with 27,600 acre-feet in 1934 and 40,650 acre-feet in 1933. Practically all the storage in Piute reservoir will go to make up storage rights in the Sevier Bridge reservoir.

Otter Creek Reservoir. On April 1, 1935 the Otter Creek reservoir contained 16,000 acre-feet as compared with 17,600 acre-feet in 1934 and 21,160 acre-feet in 1933.



Sevier Bridge Reservoir. The Sevier Bridge reservoir had in storage on April 1, 1935, 28,600 acre-feet as compared with 48,200 acre-feet in 1934 and 59,500 acre-feet in 1933.

#### Price River

Four snow courses with previous records and 2 courses established this year in the upper Price River Basin show a snow cover on the high areas only slightly less than that of 1933. The low snow was light and had practically disappeared. The soil under the snow is only damp, or dry, and the water leaving the snow is being quickly absorbed. By reason of lack of data relating to holdover storage from 1933, it appears impracticable to forecast the probable water supply for 1935, although it will probably be less than the snow measurements would indicate due to the high absorption losses which will occur as the snow melts.

Scofield Reservoir. On April 1, 1935 the Scofield reservoir contained no storage above the outlet. There is a 60 percent better snow cover on the watershed than in 1934, but the water which it will yield is problematical.

#### Huntington, Cottonwood and Ferron Creeks

Snow measurements on the range where these streams head, show a water content about the same as that for 1933 and 40 percent above that for 1934. A dry soil under the snow and a lack of low snow cover will reduce the runoff. These streams will probably furnish primary rights with a better supply than in 1934, but the supply for storage and high water rights will be about the same as in 1934.

#### Coal Creek

Two snow courses with previous records in the upper basin of Coal Creek, show a snow cover more than 100 percent better than in 1934 and 20 percent in excess of 1933. The soil under the snow is rather dry and the low snow has disappeared without increasing stream flow, with a probable high loss from soil absorption. The primary rights on Coal Creek will probably receive about the same amount as in 1933, which was considerably more than the 1934 supply. High water rights will be deficient.

#### Virgin River

There are no records for previous years, but the upper basin of the Virgin River appears to have a snow cover better than in 1934; also better than in most parts of the State. With favorable spring and summer rains, the water supply will be better than in either 1933 or 1934.

#### WASHINGTON

Yakima Valley was already assured sufficient storage water last month and conditions have improved since then. Snow in the foothills and mountains was above normal the first of March and has increased. The weather during March was cold and the run-off has been low.



WYOMING

For a discussion of conditions and prospects in this State see page 5. Status of storage in various representative reservoirs is summarized in the following tabulation prepared by the State Engineer:

RESERVOIR	CAPACITY	STORAGE, MARCH 31, 1935
.....		
	<u>NORTH PLATTE RIVER</u>	
Pathfinder Res.	1,070,000 A.F.	92,060 A.F.
Guernsey Res.	71,000 A.F.	27,320 A.F.
	<u>SNAKE RIVER</u>	
Jackson Lake Res.	837,000 A.F.	No data. Probably will fill.
	<u>LARAMIE RIVER</u>	
Wheatland Res. No.2    Appro.	90,000 A.F.	Approx. 2,000 A.F.
	<u>SHOSHONE RIVER</u>	
Shoshone Res.	457,000 A. F.	Normal. No data. Probably will fill.
	<u>CLEAR CREEK</u>	
Lake De Smet Res.	25,000 A.F.	Approx. 2,000 A.F. Probably will fill 20 percent.
	<u>TRIBUTARIES OF TONGUE RIVER</u>	
Dome Lake Res.	1,840 A.F.	Empty. Probably will fill.
Kearney Lake Res.	1,800 A.F.	Empty. Probably will fill.
Cloud Peak Res.	2,390 A.F.	Small amount stored.
Park Res.	8,000 A.F.	Practically empty. Probably will fill 50 percent.
Big Horn Res.	2,600 A.F.	Practically empty. Probably will fill 50 percent.
.....		